

Studies of *Juncus* (Juncaceae) in the Sino-Himalaya Region II. Taxonomical Studies of the *Juncus duthiei* Group

Futoshi MIYAMOTO^a and Hideaki OHBA^b

^aDepartment of Agriculture, Tokyo University of Agriculture,
Funako 1737, Kanagawa, 243-0034 JAPAN;

^bDepartment of Botany, University Museum, University of Tokyo,
Hongo 7-3-1, Bunkyo-ku, Tokyo, 113-0033 JAPAN.

(Received on February 13, 2001)

The *Juncus duthiei* group, comprising seven species, is distributed in the Sino-Himalayan floristic region. The morphological features of this group have been insufficiently known. In this paper, full descriptions and drawings of all the species of the *J. duthiei* group including: 1) *Juncus biglumoides* H.Hara; 2) *J. bryophilus* Noltie; 3) *J. duthiei* (C.B.Clarke) Noltie; 4) *J. harae* Miyam. & H.Ohba; 5) *J. rohtangensis* Goel & Aswal; 6) *J. uniflorus* W.W.Sm. and 7) *J. longiflorus* (A.Camus) Noltie are provided.

(Continued from J. Jpn. Bot. 74: 72–81, 1999)

Key words: description, *Juncus*, Sino-Himalaya, taxonomy.

The *Juncus duthiei* group, comprising *J. biglumoides* H.Hara, *J. bryophilus* Noltie, *J. duthiei* (C.B.Clarke) Noltie, *J. harae* Miyam. & H.Ohba, *J. longiflorus* (A.Camus) Noltie, *J. rohtangensis* Goel & Aswal and *J. uniflorus* W.W.Sm., is characterized by having cylindrical leaves, the sheathing bract on the peduncle absent, the lowest bract longer than or as long as the flowers, the flowers clustered in heads, and stamens as long as or shorter (sometimes slightly longer) than the perianth. These species are distributed in the Sino-Himalayan floristic region and grow in grasslands, on scree slopes and on mossy banks. The group is thought to be closely related to the *J. himalensis* group (Miyamoto and Ohba 1995), but differs in lacking a sheathing bract on the peduncle. The species of the *J. duthiei* group are morphologically similar to each other and the taxonomy of the group has been confused. One of the reasons for the confusion has been the poor circum-

scription of the species due to the lack of reliable diagnostic characters. Another reason is that some species are restricted in their distribution and the morphological features of those species are insufficiently known. This paper provides full descriptions and drawings of the seven species of the *Juncus duthiei* group.

Key to the species of the *Juncus duthiei* group

1. Anthers shorter than filaments
2. Stamens as long as or slightly longer than perianth; stem multi grooved
..... *J. biglumoides*
2. Stamens shorter than perianth; stem with a single groove or not grooved
3. Filaments three times longer than anthers; perianth chestnut brown, shining
..... *J. duthiei*
3. Filaments twice as long as anthers; perianth brown..... *J. bryophilus*

1. Anthers longer than filaments
2. Basal leaf 1 (or 2); lowest bract longer than flowers, linear-lanceolate or filiform
3. Inflorescence proliferous *J. harae*
3. Inflorescence non-proliferous
4. Anthers twice as long as filaments *J. harae*
4. Anthers four times as long as filaments
5. Rhizome stoloniferous or short creeping *J. rohtangensis*
5. Rhizomes densely branched, plants caespitose *J. longiflorus*
2. Basal leaves 2 or 3; lowest bract as long as or just exceeding flowers, lanceolate *J. uniflorus*

1) ***Juncus biglumoides*** H.Hara in J. Jpn. Bot. **49**: 201 (1974); H.Hara & al., Enum. Flow. Pl. Nepal **1**: 84 (1978). [Fig. 1]

Type: Nepal. Rambrong, Lamjung Himal, 12000 ft. (Stainton, Sykes & Williams 6029, 29 Jun. 1954, BM-holo!, GH, TI-iso!).

Juncus kangpuensis K.F.Wu in Acta Phytotax. Sin. **32**: 443, f. 1, 1–5 (1994), **syn. nov.**

Type: China. Yunnan, Weixi, Kangpu, alt. 3500 m (Chi-Wu Wang 64511, 22 Jul. 1935, PE-holo!, GH, KUN-iso!).

Juncus biglumis auct. non L.: Samuelsson in Hand.-Mazz., Symb. Sin. **7**: 1238 (1936).

Rhizomes very short. Flowering stems erect, multi grooved, 10–20 cm long, 0.4–0.7 mm wide, with 1 or 2 basal sheaths and 1–3 basal leaves. Leaves terete, multi grooved, auricles rounded, basal leaves 3–9 cm long, 0.7–1.2 mm wide; sheaths 2–3 cm long, acute; leaves on sterile shoots 2–5 cm long, 0.3–0.6 mm wide, sheaths 1–2 cm long. Inflorescence solitary, pseudolateral, flowers 1–3, bracts 2, sheathing bract absent, lowest bract stem like, appearing as a continuation of the stem, 1–3 cm long. 0.8–1.1 mm wide, grass green. Flowers 0.3–0.7 cm long, 2–3

mm wide, sessile if solitary; peduncle 0.3–0.4 mm long; perianth parts lanceolate, inner perianth parts longer than outer, 3.0–3.5 mm long, 0.9–1.1 mm wide, outer perianth parts 2.5–2.8 mm long, 0.75–0.85 mm wide, chestnut brown, shining. Stamens 6, as long as inner perianth, sometimes slightly longer than outer perianth, 3.2–3.5 mm long; filament 2.0–2.5 mm long; anther shorter than filament, ellipsoid, leather yellow, 0.8–1.0 mm long. Pistils 4.0–4.5 mm long; stigmas 1.2–1.4 mm long; styles 0.5 mm long; ovaries ovoid-trigonal, 3.5–4.0 mm long, 1.2–1.5 mm wide. Seed fusiform, 0.8–1.0 mm long, 0.20–0.26 mm wide.

Distribution: Nepal and China (Yunnan).

Additional specimens examined: Yunnan: In tergi inter vicos Haba et Dugwan-twon ad austro-orient. pagi Dschungdien regione, alt. 3850 m (Handel-Mazzetti 6902, 22 Jun. 1915, S); Weixi, Kangpu, alt. 3500 m (Chi-Wu Wang 64538, 22 Jul. 1935, KUN-paratype of *Juncus kangpuensis* K.F.Wu); Zhongdian, Around Mt. Hongshan, alt. 4200 m (Wu et al. 103044, 2 Aug. 1999, KUN, TI).

Juncus biglumoides is similar to *J. bryophilus* Noltie and *J. harae* Miyam. & H. Ohba, but differs in having the stamens as long as or slightly longer than the perianth.

Juncus kangpuensis K.F.Wu, described from two specimens collected in Weixi in Yunnan, China, is identical with *J. biglumoides*.

2) ***Juncus bryophilus*** Noltie in Edinburgh J. Bot. **51**: 137, f. 1F-K (1994); Fl. Bhutan **3** (1): 271 (1994). [Fig. 2]

Type: Bhutan. Upper Mo Chu District, ridge above Laya, on wet rock ledge, alt. 4450 m (Sinclair & Long 52717b, 21 Sept. 1984, E-holo, photo!).

Juncus harae auct. non Miyam. & H. Ohba: Miyam. in Contr. Fl. Ganesh Him.: 67 (1999).

Rhizomes very short. Flowering stems slender, ascending, terete, single grooved, 2–9 cm long, 0.3–0.5 mm wide, with one basal

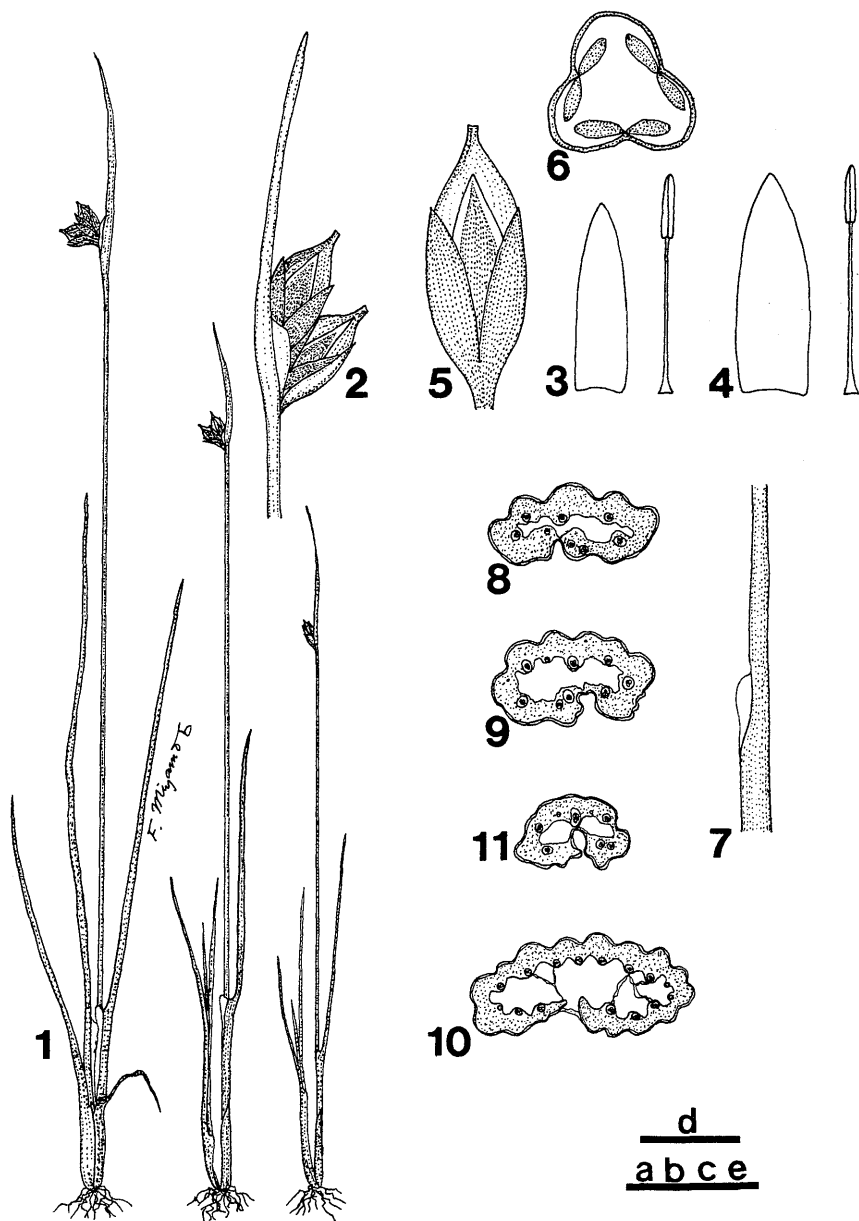


Fig. 1. *Juncus biglumoides* H.Hara. (Stainton et al. 6029). 1: Habit. 2: Inflorescence. 3: Outer perianth and stamen. 4: Inner perianth and stamen. 5: Perianth with ovary. 6: Cross section of ovary. 7: Auricle of basal leaf. 8: Cross section of upper part of stem. 9: Cross section of lower part of stem. 10: Cross section of basal leaf. 11: Cross section of lowest bract. Scales: a (2 cm) for 1; b (4 mm) for 2; c (2 mm) for 3, 4, 5 and 7; d (1 mm) for 6; e (0.5 mm) for 8, 9, 10 and 11.

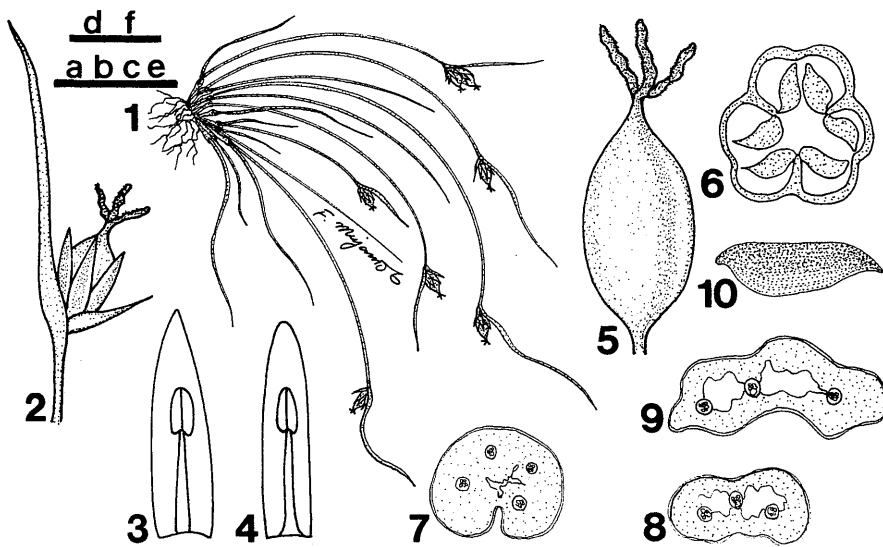


Fig. 2. *Juncus bryophilus* Noltie. (Miyamoto et al. 9410195). 1: Habit. 2: Inflorescence. 3: Outer perianth and stamen. 4: Inner perianth and stamen. 5: Ovary. 6: Cross section of ovary. 7: Cross section of middle part of stem. 8: Cross section of basal leaf. 9: Cross section of lowest bract. 10: Seed. Scales: a (2 cm) for 1; b (4 mm) for 2; c (2 mm) for 3, 4 and 5; d (1 mm) for 6; e (0.5 mm) for 7, 8 and 9; f (0.5 mm) for 10.

sheath and one basal leaf or sometimes absent. Leaves terete, complanate, auricles rounded, basal leaves 0.5–4.0 cm long, 0.4–0.5 mm wide, grass green; sheaths 2–3 mm long, brown; leaves on sterile shoots, 1–10 cm long, 0.3–0.6 mm wide, sheaths 4–6 mm. Inflorescence solitary, pseudolateral; flowers 1 or 2(–3); bracts 2, sheathing bract absent, lowest bract stem like, appearing as a continuation of the stem, 0.5–2.5 cm long, 0.6–0.8 mm wide, grass green. Flowers 2.5–5.0 mm long, 1.6–2.0 mm wide; flower sessile if solitary, peduncle 0.4–0.5 mm long; perianth parts lanceolate, outer perianth parts slightly longer than inner, 3.2–3.7 mm long, 0.9–1.0 mm wide, inner perianth parts 3.0–3.5 mm long, 0.7–1.0 mm wide, brown. Stamens 6, shorter than perianth, 2.2–2.5 mm long; filament 1.4–1.6 mm long; anther shorter than filament, ellipsoid, leather yellow, 0.6–0.7 mm long. Pistils 4–5 mm long; stigmas 1.2–

1.4 mm long; styles 0.3–0.4 mm long; ovaries ovoid-trigonal, 3.5–4.0 mm long, 1.2–1.6 mm wide. Seeds fusiform, 0.8–1.0 mm long, 0.20–0.26 mm wide.

Distribution: Nepal, Sikkim and Bhutan.

Additional specimens examined: Nepal: Bagmati Zone, Rasuwa Distr., a Kharka–Pati Kharka, 28° 15' N, 85° 10' E, alt. 3650 m (Miyamoto et al. 9410195, 4 Aug. 1994, TI). Sikkim: Dzungri, alt. 4000 m (ESIK 698, 25 Jul. 1992, E, TI—paratype of *J. bryophilus* Noltie). Bhutan: Wangdi Phodrang Distr., Maorothang–Tintatso, 27° 39' N, 90° 31' E, alt. 3700 m (Miyamoto 9361571, 20 Sept. 1993, TI).

Juncus bryophilus is similar to *J. harae* Miyam. & H. Ohba and *J. uniflorus* W.W.Sm., but differs in having the filaments longer than the anthers. This species is distributed disjunctly in central Nepal, Sikkim and Bhutan.

3) *Juncus duthiei* (C.B. Clarke) Noltie in Edinburgh J. Bot. **51**: 134 (1994). Simpson

& Noltie in Kew Bull. **50**: 169–170 (1995).

[Fig. 3]

Microschoenus duthiei C.B. Clarke in Hooker, Fl. Brit. India **6**: 675 (1894).

Type: India. Uttar Pradesh, Rhudughera, Tihri Garhwal, alt. 15–16000 ft. (Duthie 132,

20 Jul. 1882, K-holo!).

Rhizomes very short. Flowering stems erect, terete, 0.7–5.0 cm long, 0.5–0.7 mm wide, with 1 or 2 basal sheaths and 2 basal leaves. Leaves terete, auricles rounded, basal leaves 1–6 cm long, 0.4–0.7 mm wide, grass

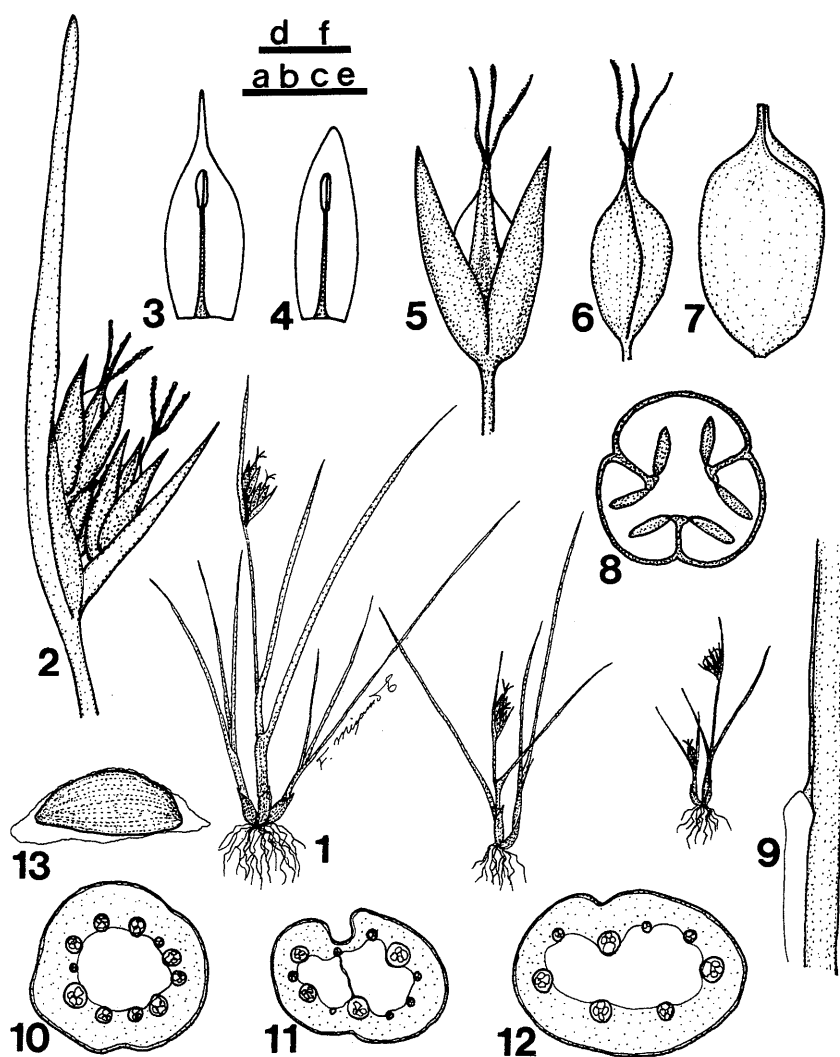


Fig. 3. *Juncus duthiei* (C.B. Clarke) Noltie. (Takayama et al. 9220322). 1: Habit. 2: Inflorescence. 3: Outer perianth and stamen. 4: Inner perianth and stamen. 5: Flower. 6: Ovary. 7: Capsule. 8: Cross section of ovary. 9: Auricle of basal leaf. 10: Cross section of stem. 11: Cross section of lowest bract. 12: Cross section of basal leaf. 13: Seed. Scales: a (2 cm) for 1; b (4 mm) for 2 and 9; c (2 mm) for 3, 4, 5, 6 and 7; d (1 mm) for 8; e (0.5 mm) for 10, 11 and 12; f (0.5 mm) for 13.

green; sheaths 3–5 mm long, brown; leaves on sterile shoots, 1–4 cm long, 0.3–0.6 mm wide, sheaths 3–4 mm long. Inflorescence solitary, pseudolateral; flowers 1–3; bracts 2, longer than flowers, sheathing bract absent; lowest bract 0.8–2.3 cm long, 0.6–0.8 mm wide, grass green. Flowers 0.5–0.9 cm long, 1.5–2.0 mm wide; peduncle 0.6–3.5 mm long; perianth part ovate-lanceolate, outer perianth parts cuspidate, 2.8–3.0 mm long, 0.9–1.3 mm wide, chestnut brown. Stamens 6, shorter than perianth, 2.0–2.3 mm long; filament 1.5–1.7 mm long; anther shorter than filament, ellipsoid, leather yellow, 0.4–0.5 mm long. Pistils 3.8–4.2 mm long; stigmas 1.2–1.4 mm long; styles 0.2–0.3 mm long; ovaries ovoid-trigonous, 2.8–3.4 mm long, 1.2–1.3 mm wide. Seeds fusiform, 0.77–0.83 mm long, 0.30–0.36 mm wide.

Distribution: India and Nepal.

Additional specimen examined: Nepal: Bagmati Zone, Rasuwa Distr., around base camp, 28° 13'09"N, 85° 37'17"E, alt. 4920 m (Takayama et al. 9220322, 21 July 1992, TI).

Juncus duthiei was originally described under the monotypic genus *Microschoenus*, Cyperaceae (Clarke 1894), and was moved to *Juncus* by Noltie (1994). Noltie (1994) noted that this species has the anthers longer than the filaments, a long style (1.5–4.0 mm long) and red stigma. However, we checked the type specimen and samples collected in central Nepal and found the anthers to be shorter than the filaments, the styles very short (0.2–0.3 mm long) and the stigmas pale yellow. We examined the specimens cited by Noltie (1994) and found that he identified both *J. duthiei* and *J. rohtangensis* as *J. duthiei*.

This species is most similar to *J. bryophilus*, but differs in having the filaments three times longer than the anthers and a chestnut brown perianth.

4) *Juncus harae* Miyam. & H. Ohba in J. Jpn. Bot. **68**: 27, f. 1 (1993). [Fig. 4]

Type: Nepal. Koshi Zone, Sankhuwa Sabha Distr., Sano Pokhari–Khongma, alt. 3850 m (M. Minaki, C. Yonebayashi, F. Miyamoto, H. Takayama, H. Sugita, H. Yagi, N. Subedi & H. Ikeda 9020853, 12 Aug. 1990, TI-holo!).

Rhizomes very short. Flowering stems slender, ascending, complanate, multi-grooved, 3–25 cm long, 0.3–0.5 mm wide, with one basal sheaths and one basal leaf on stems with normal flowers, basal leaf absent on stems with viviparous flowers. Leaves complanate, auricles rounded, basal leaves 2–3 cm long, 0.2–0.4 mm wide, multi-grooved, grass green; sheaths 1.0–1.5 mm long, straw yellow; leaves on sterile shoots, 2–10 cm long, 0.2–0.4 mm wide, sheaths 0.8–1.8 cm long. Inflorescences with normal flowers solitary, pseudolateral; flowers 1, bracts 2; inflorescences with viviparous flowers with 3–7 flowers. Sheathing bract absent on peduncle; lowest bracts longer than flowers, 0.5–3.0 cm long, 0.2–0.3 mm wide, grass green. Flowers viviparous or non viviparous, sometimes mixed. Normal flowers 0.5–0.8 cm long, 1.2–1.5 mm wide; peduncle 0.3–0.5 mm long; perianth parts ovate-lanceolate, 2.8–4.0 mm long, 1.0–1.3 mm wide, brown. Stamens 6, shorter than perianth, 2.5–2.8 mm long; filaments 0.8–0.9 mm long; anthers longer than filament, linear-ellipsoid, leather yellow, 1.6–1.8 mm long. Pistils 0.5–0.8 cm long; stigmas 2.8–3.0 mm long, pale yellow; styles 1.5–2.0 mm long; ovaries ovoid-trigonous, 2.8–3.0 mm long, 1.2–1.5 mm wide. Seeds 0.3–0.32 mm long, 0.9–1.1 mm wide. Viviparous flowers 2.5–3.8 mm long, one inner perianth part transformed into a propagule, inner perianth parts lanceolate, aristatae, 1.8–2.5 mm long, 0.5–0.6 mm wide, stamens and ovary reduced.

Distribution: Nepal, Bhutan and China (Yunnan).

Additional specimens examined: Nepal: Koshi Zone, Sankhuwa Sabha Distr., Khongma–ChaDing

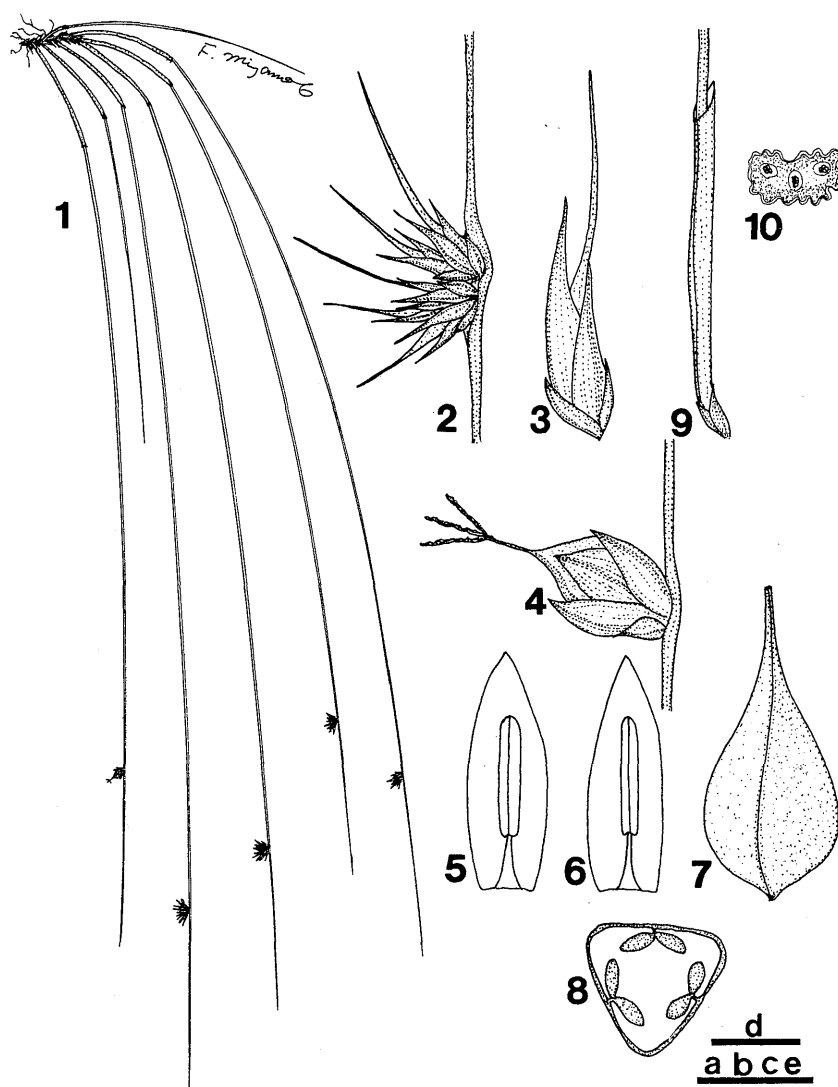


Fig. 4. *Juncus harae* Miyam. & H. Ohba. (Minaki et al. 9020853). 1: Habit. 2: Proliferous Inflorescence. 3: Proliferous flower. 4: Normal inflorescence. 5: Outer perianth and stamen. 6: Inner perianth and stamen. 7: Ovary. 8: Cross section of ovary. 9: Sheathing leaf. 10: Cross section of middle part of stem. Scales: a (2 cm) for 1; b (4 mm) for 2, 4 and 9; c (2 mm) for 3, 5, 6 and 7; d (1 mm) for 8; e (0.5 mm) for 10.

Kharka, 27° 40'N, 87° 10'E, alt. 3570 m (Minaki et al. 9020629, 5 Aug. 1990, TI); Bagmati Zone, Rasuwa Distr., Yure Kharka-Tinbu Kharka, 28° 10'N, 85° 13' E, alt. 3700 m (Miyamoto et al. 9410057, 26 Jul. 1994, TI); Sagarmatha Zone, Solukhumbu Distr., Gnaula-Pike, 27° 33'N, 86° 27'E, alt. 3600 m (Miyamoto et al.

9580051, 22 Jul. 1995 TI). Bhutan: Wangdi Phodrang Distr., Tampakto-Tsonsohang, 27° 48'N, 90° 29'E, alt. 3900 m (Miyamoto 9361642, 22 Sept. 1993, TI); loc. cit., Tsonsohang-Tampakto, 27° 46'N, 90° 31'E, alt. 4000 m (Miyamoto 9361680, 24 Sept. 1993, TI). China: Yunnan, Zhongdian, Around Beihai (Mt. Haba

Xueshan), alt. 4100 m (Wu et al. 103082, 9 Aug. 1999, KUN).

This species is similar to *J. rohtangensis*, but differs in having the anthers twice as long as the filament and a pale yellow stigma.

5) ***Juncus rohtangensis*** Goel & Aswal in Indian J. Forest. **10**: 262, f. 1–8 (1987).

[Fig. 5]

Type: India. Lahaul Spiti Distr., Rhotang Pass, alt. 4000 m (Aswal 10554, 27 Jul. 1970, CDRI-holo n.v., CAL-iso!).

Juncus nigroviolaceus K.F.Wu in Acta Phytotax. Sin. **32**: 448, f. 2, 10–12 (1994). **syn. nov.**

Type: China. Xizang, Cona, 4300 m, Cheng-yih Wu & Shu-kun Chen 75-612 (HNWP-holo, n.v., KUN-iso!).

Juncus sikkimensis var. *monocephalus* Hook.f., Fl. Brit. India **6**: 399 (1892) **syn. nov.**

Type: Sikkim. Lachen; alt. 11000–12000 ft. (Hooker s.n., 20 Jun. 1849, K-holo!, B, GH-iso!).

Juncus duthiei (C.B. Clarke) Noltie in Edinburgh J. Bot. **51**: 134 (1994), pro. part.

Juncus uniflorus Miyam. & H. Ohba in Alp. Fl. Jaljale Him.: 73 (1992), pro. part.

Juncus uniflorus auct. non W.W.Sm.: Miyamoto in Contr. Fl. Ganesh Hima.: 69 (1999).

Rhizomes stoloniferous or short creeping. Flowering stems erect, terete, 1–28 cm long, 0.3–0.8 mm wide, basal sheaths 1 or 2, basal leaf 1 (or 2). Leaves terete, auricles rounded, basal leaves 0.8–9.0 cm long, 0.4–0.75 mm wide, grass-green; sheaths 2–10 mm long, brown; leaves on sterile shoots, 1–18 cm long, 0.25–0.70 mm wide, sheaths 2–10 mm. Inflorescence solitary, pseudolateral, flowers 1–3; bracts 2, longer than flowers, sheathing bract absent; lowest bract 0.4–2.8 cm long, 0.4–0.8 mm wide, grass green. Flowers 0.3–1.4 cm long, 1.2–2.5 mm wide; flower sessile if solitary, peduncle 0.6–2.5 mm long;

perianth parts ovate-lanceolate, 1.8–3.9 mm long, 0.5–1.2 mm wide, chestnut brown. Stamens 6, shorter than perianth, 1.0–3.1 mm long; filaments 0.17–0.5 mm long; anther longer than filament, linear-ellipsoid, leather yellow, 0.83–2.6 mm long. Pistils 0.28–1.20 cm long; stigmas 0.9–4.0 mm, red; styles 0.8–4.0 mm long; ovaries ovoid-trigonous, 0.9–4.5 mm long, 0.4–2.0 mm wide. Seed fusiform, 0.5–1.0 mm long, 0.13–0.4 mm wide.

Distribution: Nepal, India, Sikkim, Bhutan and China (Tibet).

Additional specimens examined: Nepal: Hong Khola, 27° 30'N, 86° 45'E, alt. 14000 ft. (McCosh 353, 2 Jul. 1964, BM, TI); Lari, 28° 14'N, 85° 11'E, alt. 4650 m (Yon 107, 7 Jul. 1974, BM); Above Sauwala Khola, alt. 13000 ft. (Stainton et al. 3582, 22 Jul. 1954, BM, CAL, GH, UPS); Mukutinath, alt. 3962 m (Stainton & Williams 1451, 26 Jun. 1954, BM, UPS); Shiar Khola, west of Chumje, alt. 12500 ft. (Gardner 1016, 29 Jun. 1953, BM); Dhdkund, 6 miles E. of Timure, alt. 15500 ft. (Polunin 810, 5 Jul. 1949, BM); 5 miles E. Timure, alt. 13500 ft. (Polunin 801, 3 Jul. 1949, BM); Langtang Valley, alt. 15000 ft. (Polunin 626, Jun. 1949, BM); Rock shelter II-Gadje, alt. 3220–3950 m (Kanai & Malla 174837, 25 Aug. 1969, KATH, TI); Mul Kharka, Chikime Khola, alt. 3800–4100 m (Kanai et Shakya 676208, 3 Jul. 1970, KATH, TI); Tharepati, N. of Kathmandu, alt. 3200 m (Wilson & Phillips 163, 27 Jun. 1973, K); Janakpur Zone, Ramechhap Distr., Dubikharka-Baula Pokhari, alt. 3720–4000 m (Ohba et al. 8570328, 9 Jul. 1985, TI); Janakpur Zone, Ramechhap Distr., Chhu-Ningma-Jata Pokhari, alt. 4040–4220 m (Ohba et al. 8570426, 12 Jul. 1985, TI); Janakpur Zone, Ramechhap Distr., Jata Pokhari—a peak—a peak on northwest of Panch Pokhari-Jata Pokhari, 27° 43'N, 86° 25'E, alt. 4220–4893 m, (Suzuki et al. 8580308, 16 Jul. 1985, TI); Janakpur Zone, Ramechhap Distr., Koshing Kharka-Thare Og, alt. 4000–4150 m (Ohba et al. 8570732, 22 Jul. 1985, TI); Koshi Zone, Sankhuwa Sabha Distr., Khongma-Cha Ding Kharka, 27° 40'N, 87° 10'E, alt. 4100 m (Minaki et al. 9020636, 5 Aug. 1990, TI); Koshi Zone, Sankhuwa Sabha Distr., Around Cha Ding Kharka, 27° 40'N, 87° 10'E, alt. 3400 m (Minaki et al. 9020746, 9020822, 9 Aug. 1990, TI); Koshi Zone, Sankhuwa Sabha Distr., Around Cha Ding Kharka, alt. 4150 m (Minaki et al. 9020824, 9 Aug. 1990, TI); Koshi Zone, Sankhuwa Sabha Distr., Jaljale Himal, around Banduke, 27° 30'N, 87° 30'E, alt. 4150 m

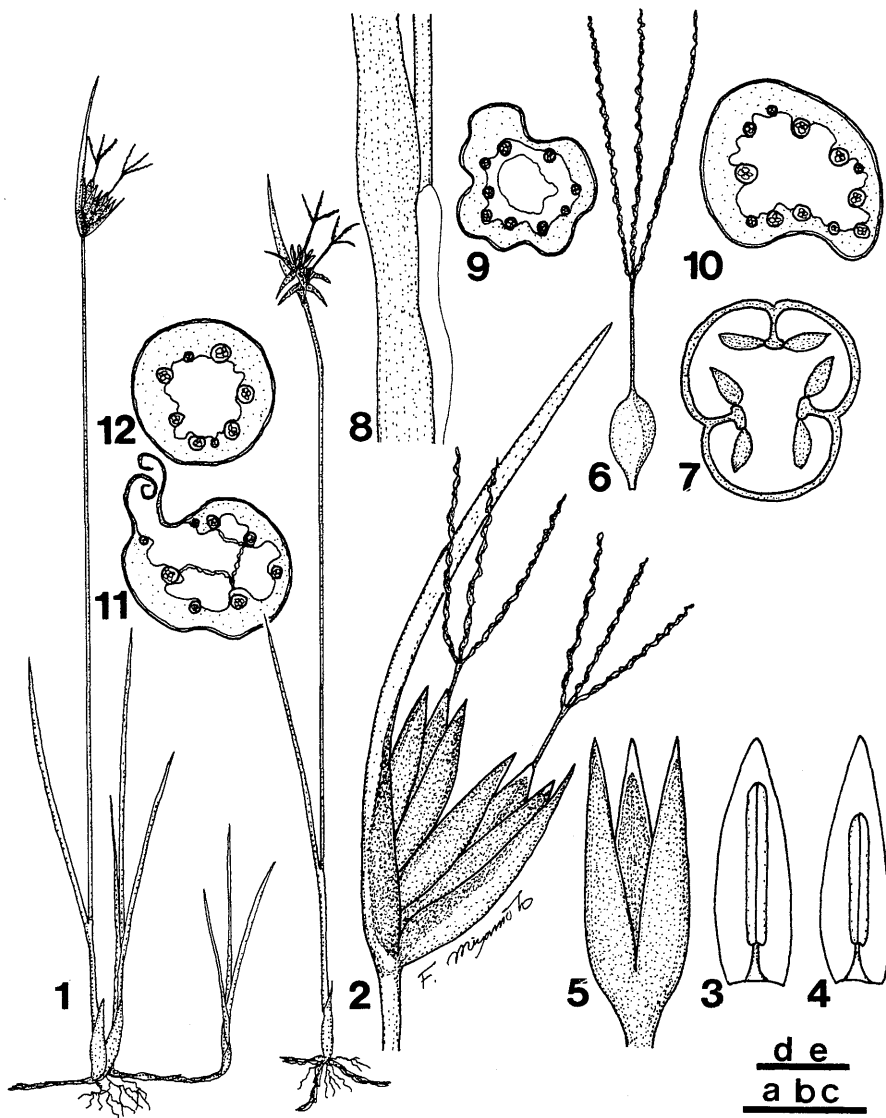


Fig. 5. *Juncus rohtangensis* Goel & Aswal. (Takayama et al. 9220175). 1: Habit. 2: Inflorescence. 3: Outer perianth and stamen. 4: Inner perianth and stamen. 5: Perianth. 6: Pistil. 7: Cross section of ovary. 8: Auricle of basal leaf. 9: Cross section of lower part of stem. 10: Cross section of upper part of stem. 11: Cross section of lower part of basal leaf. 12: Cross section of upper part of basal leaf. Scales: a (2 cm) for 1; b (4 mm) for 2; c (2 mm) for 3, 4, 5 and 6; d (1 mm) for 7, 9, 10, 11, 12; e (0.5 mm) for 8.

(Ohba et al. 9110215, 9110232, 9120193, 25 July–3 Aug. 1991, TI); Koshi Zone, Sankhuwa Sabha Distr., Makalu Base Camp, 27° 48'N, 87° 06'E, alt. 4728 m (Emery CH25, 8 Jul. 1974, K); Bagmati Zone, Rasuwa Distr., Kyangjin Kharka–Yala Kharka, alt. 4580 m

(Takayama et al. 9220175, 14 Jul. 1992, TI); Bagmati Zone, Rasuwa Distr., Around Base Camp, 28° 13'09"N, 85° 37'17"E, alt. 4920 m (Takayama et al. 9220319, 21, Jul. 1992, TI); Bagmati Zone, Rasuwa Distr., Yala Kharka–Langtrang, alt. 4700 m

(Takayama et al. 9220359, 22 Jul. 1992, TI); Bagmati Zone, Rasuwa Distr., around Tinbu Kharka, 28° 11'N, 85° 13'E, alt. 3750 m (Miyamoto et al. 9410080, 27 Jul. 1994, TI); Bagmati Zone, Rasuwa Distr., Tinbu Kharka–Tulo Bhera Kharka, 28° 12'N, 85° 14'E, alt. 4100 m (Miyamoto et al. 9410098, 28 Jul. 1994, TI); Bagmati Zone, Rasuwa Distr., Tulo Bhera Kharka–Jaisuli Kund, 28° 12'N, 85° 13'E, alt. 4300 m (Miyamoto et al. 9410118, 9410119, 30 Jul. 1994, TI); Bagmati Zone, Rasuwa Distr., around Jaisuli Kund, 28° 11'N, 85° 11'E, alt. 4500 m (Miyamoto et al. 9410129, 31 Jul. 1994, TI); Bagmati Zone, Rasuwa Distr., Ganesh Base Camp–a Kharka, 28° 15'N, 85° 06'E, alt. 3860 m (Miyamoto et al. 9410250, 10 Aug. 1994 TI); Sagarmatha Zone, Solukhumbu Distr., around Dudhkund, 27° 42'N, 86° 36'E, alt. 4500 m (Ohba et al. 8581207, 27 Aug. 1985, TI); Sagarmatha Zone, Solukhumbu Distr., Rato Odara–Chhomalangi Base Camp, 27° 43'N, 86° 54'E, alt. 4600 m (Miyamoto et al. 9580282, 11 Aug. 1995, TI); Sagarmatha Zone, Solukhumbu Distr., Chhomalangi Base Camp–Seto Pokhari, 27° 47'N, 86° 55'E, alt. 4400 m (Miyamoto et al. 9580304, 12 Aug. 1995, TI); Sagarmatha Zone, Solukhumbu Distr., Chhomalangi Base Camp–Rato Odara, 27° 47'N, 86° 55'E, alt. 4600 m (Miyamoto et al. 9580347, 18 Aug. 1995 TI); Bhalukhop, alt. 13400 ft. (Shrestha et al. 292, 24 Jul. 1971, BM). Sikkim: Chakung Chu, alt. 13000 ft. (Smith 3854, 26 Jul. 1910, K-syntype of *Juncus uniflorus*); Choktse (King s.n., Jun. 1887, CAL, K); Zumu Valley (Smith & Cave 2808, 20 Jul. 1909, CAL); Dzongri, alt. 4000 m (Starling et al. AGSES268, 2 Jul. 1983, K). Bhutan: Chesha La, alt. 14000 ft. (Ludlow et al. 16647, 27 Jun. 1949, BM); Wangdi Phodrang Distr., Maorothang–Tintatso, 27° 39'N, 90° 31'E, alt. 4000 m (Miyamoto 9361566, 20 Sept. 1993, TI); Wangdi Phodrang Distr., Tintatso–Tampe La, 27° 43'N, 90° 31'E, alt. 4200 m (Miyamoto 9361592, 21 Sept. 1993, TI); Wangdi Phodrang Distr., Tampe La, 27° 44'N, 90° 31'E, alt. 4500 m (Miyamoto 9361607, 9361611, 9361612, 21 Sept. 1993, TI). Tibet: Chumbi, Dotha, alt. 13000 ft. (Bor & Ram 20510, 20 Jun. 1945, K).

This species is very variable in size. Dwarf individuals are similar to *J. uniflorus*, but differ from them in having the anthers five times longer than the filaments, the lowest bract grass green and exceeding the flowers and the perianth chestnut brown. Larger plants are similar to *Juncus sikkimensis* Hook.f., but differ in lacking sheath-like bracts. *Juncus sikkimensis* var. *monocephalus* Hook.f., described from Sikkim, is identi-

cal with *J. rohtangensis*.

6) ***Juncus uniflorus*** W.W.Sm. in Rec. Bot. Surv. India 6: 104 (1914). Hara & al., Enum. Flow. Pl. Nepal 1: 85 (1978). Noltie in Edinburgh J. Bot. 51: 136 (1994); Fl. Bhutan 3 (1): 270, f. 251 (1994). [Fig. 6]

Type: Sikkim. Se-moo-do-ne about 2500 ft. below the Jelep La (i.e., about 12000 ft.), (King s.n., 22 Jun. 1882, K-lecto! selected by Noltie in 1994, CAL-isolecto!).

Distribution: East Himalaya (Nepal, Sikkim and Bhutan).

Rhizomes very short. Flowering stems erect, terete, 1–3 cm long, 0.2–0.3 mm wide, basal sheaths 1 or 2, basal leaves 2 or 3. Leaves terete, auricles oblique, basal leaves 0.8–2.5 cm long, 0.25–0.32 mm wide, grass green; sheaths 2–5 mm long, brown; leaves on sterile shoots, 1–4 cm long, 0.25–0.35 mm wide, sheaths 2–5 mm long. Inflorescence solitary, pseudolateral, flower solitary or sometimes 2, bracts 2, as long as or just exceeding flowers, sheathing bract absent; lowest bract 0.25–0.45 cm long, 0.4–0.8 mm wide, brown. Flowers 0.30–0.55 cm long, 1.0–1.5 mm wide; sessile; perianth parts lanceolate, 1.8–3.0 mm long, 0.4–0.6 mm wide, brown. Stamens 6, shorter than perianth, 1.0–1.7 mm long; filaments 0.24–0.70 mm long; anther longer than filament, linear-ellipsoid, leather yellow, 0.36–1.0 mm long. Pistils 0.28–0.52 cm long; stigmas 0.8–1.2 mm; styles 0.8–1.0 mm long; ovaries ovoid-trigonal, 1.2–3.5 mm long, 0.5–1.5 mm wide. Seeds fusiform, 0.5–0.6 mm long, 0.30–0.33 mm wide.

Additional specimens examined: Nepal: Koshi zone, Sankhuwa Sabha Distr., Around Cha Ding Kharka, 27° 40'N, 87° 10'E, alt. 4150 m (Minaki et al. 9020823, 9 Aug. 1990, TI); Arun-Tamur watershed, S. of Topke Gola, 13000 ft. (Stainton 872, 7 Jul. 1956, BM, TI). Sikkim: Above Changu, alt. 12000 ft. (Smith 3202, 8 Jul. 1910, K); Sherad Mang, alt. 12000–13000 ft. (Cooper 307, 18 Jul. 1913, BM, S). Bhutan: Shingbe, Me La, alt. 12000 ft. (Ludlow et al. 20693, 3 Jun. 1949, BM, GH, UPS); Pajoding, above Thimphu,

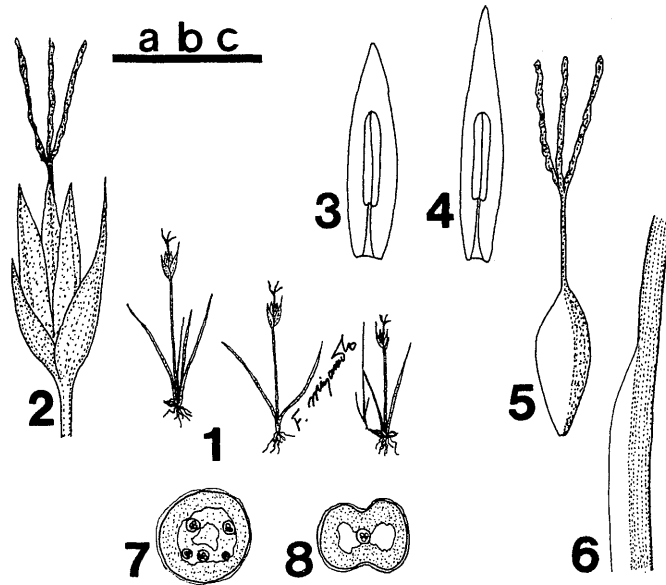


Fig. 6. *Juncus uniflorus* W.W.Sm. (H. Ohba et al. 9110215). 1: Habit. 2: Inflorescence. 3: Outer perianth and stamen. 4: Inner perianth and stamen. 5: Ovary. 6: Auricle of basal leaf. 7: Cross section of lower part of stem. 8: Cross section of basal leaf. Scales: a (2 cm) for 1; b (4 mm) for 2, 3, 4, 5 and 6; c (2 mm) for 7 and 8.

27° 29'N, 89° 35'E, alt. 3750 m (Grierson & Long 2783, 19 Jul. 1973 K); Wangdi Phodrang Distr., Tsonsothang, 27° 49'N, 90° 24'E, alt. 4100 m (Miyamoto 9361636, 22 Sept. 1993, TI); loc. cit. Tampetso–Tsonsothang, 27° 48' N, 90° 31'E, alt. 3900 m (Miyamoto 9361679, 24 Sept. 1993, TI).

Juncus uniflorus is one of the smallest species of *Juncus* in the Sino-Himalayan region. It is similar to *J. rohtangensis*, but differs from the latter in having 2 or 3 basal leaves, a brown perianth and anthers 1.5 to 2 times longer than the filaments.

7) ***Juncus longiflorus*** (A.Camus) Noltie in Edinburgh J. Bot. **51**: 134 (1994). Miyamoto & H. Ohba in J. Jpn. Bot. **74**: 76, f. 3 (1999).

Distribution: China (Tibet and Yunnan).

Additional specimens examined: China. Yunnan: Mekong–Salwin Divide Sila, alt. 3800 m (Yü 22257, 9 Aug. 1938, PE, GH); Gong Shan, alt. 3800 m (Yü 22807, 17 Oct. 1938, PE); Deqin, alt. 3800 m (Feng

6594, 13 Aug. 1940, PE); Deqin, alt. 3400 m (Tsai 53953, 30 Jul. 1933, PE); Che-tse-lo, alt. 4000 m (Tsai 58054, 18 Aug. 1934, GH, PE); Che-tse-lo (Tsai 58222, 27 Aug. 1934, GH, PE); Pi-lo-shan, Che-tse-lo, alt. 4000 m (Tsai 58621, 15 Sept. 1934, GH, PE); Yanbgi Xian, W side of Diancang Shan mountain range. Vicinity of Baiyungeng Peak above Malutang, alt. 3500–3600 m (B. Bartholomew et al. 585, 26 Jun. 1984, KUN); Dali Xian, alpine meadow near the summit of Diancang Shan mountain range in the vicinity of Yinglofeng Peak, directly W of Dali city, alt. 3900 m (B. Bartholomew et al. 1035, 11–12 Jul. 1984, KUN).

Morphological features of this species were mentioned in Miyamoto and Ohba (1999).

This study was supported by a Grant-in-Aid for Scientific Research (A) from the Japan Society for the Promotion of Science, no. 11691178 (to H.O.), in 1999 and 2000.

We are greatly indebted Dr. D. E.

Boufford, Harvard University, for his critical reading and for correcting the English of the manuscript.

References

- Clarke C. B. 1894. Cyperaceae. In Hooker, J. D., Flora of British India 6: 585–748.
Miyamoto F. and Ohba H. 1995. Taxonomic studies of

the *Juncus himalensis* group in Himalaya. J. Jpn. Bot. 72: 162–167.

—— and —— 1999. Studies of *Juncus* (Juncaceae) in the Sino-Himalayan Region I. Notes on Some Species in Southwest China. J. Jpn. Bot. 74: 72–81.

Noltie H. J. 1994. Notes relating to the flora of Bhutan: XXIV. Edinburgh J. Bot. 51: 129–143.

宮本 太^a, 大場秀章^b: 中国—ヒマラヤ植物区系におけるイグサ属植物の分類学的研究 II. *Juncus duthiei* group の分類学的研究

Juncus duthiei グループは頭状花序をもつこと、雄蕊は花被片より短いこと、最下の苞葉が小花より長いこともあるいは同長、花柄に鞘状の苞葉を持たないことで特徴づけられる。 *J. himalensis* グループ (Miyamoto and Ohba 1995) に近似するが、花柄に鞘状の苞葉を持たないことで明らかに異なる。 *Juncus duthiei* グループは形態が極めて近似するため、種の認識が非常に混乱している。そのため一つの標本に複数の種が含まれることも珍しくない。このようなことから本研究は *Juncus duthiei* グループの分類学的検討をおこなった。

1) *Juncus biglumoides* H.Hara は *J. briophilus* と *J. harae* に近似するが、雄蕊が花被と同長あるいはわずかに長いことで異なる。 2) *Juncus bryophilus* Noltie はこれまでシッキムおよびブータンから報告されている。今回中央ネパールよりはじめて記録された。本種は *Juncus uniflorus* に似るが花糸

が葯より長いことで異なる。 3) *Juncus duthiei* (C.B.Clarke) Noltie は *J. bryophilus* に似るが、花糸が葯より3倍長であること、花被が光沢のある栗褐色であることで異なる。 4) *Juncus harae* Miyam. & H.Ohba は *J. rohtangensis* に似るが葯が花糸より2倍長であること、柱頭が淡い黄色になることで異なる。 5) *Juncus rohtangensis* Goel & Aswal は変異が大きく、小さい個体は *J. uniflorus* に似る。しかし、葯が花糸より5倍長いこと、最下の苞葉が小花より長いことで区別できる。また大型の個体は *J. sikkimensis* Hook.f. と近似するが花柄に鞘状の苞葉をもたないことで明らかに異なる。 6) *Juncus uniflorus* W.W.Sm. は中国—ヒマラヤ地域の *Juncus* で最も小さい種の一つである。 7) *Juncus longiflorus* (A.Camus) Noltie の追加標本を示した。

(^a東京農業大学農学部,

^b東京大学総合研究博物館)